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ABSTRACT

The objective of this study includes a determination of the need for additional dental service and an examination of the dental service delivery system in the state of Ohio. Recognizing that the question of dental manpower and the service it delivers is but one facet of the area of oral health maintenance, and that manpower needs are affected by other factors, the study investigated the following areas: (1) the need for dentists and dental auxiliary personnel in Ohio; (2) the distribution of such personnel in Ohio; (3) the changing role of auxiliary dental personnel; (4) the potential effect of third-party reimbursement upon dental services; (5) national trends in dental manpower and their overall effect on Ohio; and (6) other factors affecting the availability and utilization of dental care. (Author/DMF)

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ED116524

A STUDY TO DETERMINE THE DENTAL NEEDS IN OHIO

JUNE 1975

OHIO BOARD OF REGENTS

U.S. DEPARTMENT OF HEALTH
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PREFACE

In 1973, the Ohio General Assembly enacted legislation supporting a feasibility study for the establishment of a dental college in connection with the Medical College of Ohio at Toledo. Following discussions between the Ohio Board of Regents and legislative representatives, it was mutually agreed that the objective of such a study should be broadened to include a determination of the need for additional dental service and an examination of the dental service delivery system in the state of Ohio.

In mid-January 1975, the Board of Regents signed a contract with Optimum Governmental Systems, Inc., 3363 Tremont Road, Columbus, Ohio, to conduct such a study under the direction of Dr. Richard D. Ruppert, Vice-Chancellor for Health Affairs, Ohio Board of Regents.

Recognizing that the question of dental manpower and the service it delivers is but one facet of the area of oral health maintenance, and that manpower needs are affected by other factors, the study investigated the following areas:

(1) the need for dentists and dental auxiliary personnel in Ohio;

(2) the distribution of such personnel in Ohio;

(3) the changing role of auxiliary dental personnel, particularly with the passage of Amended Senate Bill 388 by the 110th General Assembly;

(4) the potential effect of third-party reimbursement upon dental services;

(5) national trends in dental manpower and their overall effect on Ohio; and

(6) other factors affecting the availability and utilization of dental care.

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Introduction

The major concern of this study is the oral health of the citizens of Ohio. Oral health does not begin or end primarily with the dentist or his services. It begins with the individual and the care which he chooses to provide for his own oral health. Good oral health is achieved mainly by preventing and controlling dental diseases and malfunctions. The primary prevention and control methods are: good oral hygiene habits; good nutritional habits; fluoridation; and periodic dental check-ups. The impact of fluoridation is evident from a number of studies which have shown that an adequate level of fluoride in a community's drinking water reduces the incidence of dental caries by as much as 60%.(1)

The major participants in the prevention and control process are consumers (including parents), dentists, dental auxiliaries, dental school faculty, schools, university researchers, nutritionists, public health nurses, physicians, dental associations, legislators, dental students, dental technicians, producers of dental equipment and supplies, manufacturers of other oral products, food processors, the advertising media, the news media, and dental salesmen. All are involved in this prevention and control process with the behavior of the individual as the most important factor.

In reference to the objective of good oral health, most of the current oral health literature states or implies one or more of the following: (1) there is a great "need" for dental care;

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(1) McClure, F.J.: Water Fluoridation - the Search and the Victory. Bethesda, U.S. Department of Health, Education and Welfare, National Institute of Dental Research, 1970

(2) there is a shortage of dental manpower; (3) dental manpower is "maldistributed"; and (4) dental manpower utilization is inefficient. Among these four issues of need, shortage, maldistribution and inefficiency, most would agree with the last two. In most of the studies, the major problem is the discrepancy betweem "need" and "demand". It is estimated that 95% of the population is in need of oral health care with a visit to the dentist at least once a year, but only 47% of the population visits the dentist once a year.(2) Because of this failure to seek dental treatment, the amount of untreated disease in the mouths of the American public is staggering. It was projected that twenty million people in the United States have no natural teeth, and that in ninety million others, there are missing teeth or unfilled carious lesions.(3) This apparent lack of demand is related to the public's concept of good oral health, which is not related to, nor does it parallel, the public's concept of good health. Demand is concerned with a variety of factors, including the public's understanding of its own oral health needs, the cost of dental care, the fear of pain and suffering and, in certain areas, the availability of dental services. When need is defined by health professionals, governmental units, commissions or agencies, it may be viewed as

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(2) Dental Visits - Volume and Interval Since Last Visit, U.S. 1969. National Center for Health Statistics, Public Health Service.

(3) Decayed, Missing and Filled Teeth in Adults, U.S. 1960-1962. National Center for Health Statistics, Public Health Service.

> That quantity of medical services which expert medical opinion believes ought to be consumed over a relevant time period in order for its members to remain or become as "healthy" as is permitted by existing medical knowledge. (4)

Various studies have shown that the level of education and income of consumers are two of the primary determinants of the demand for dental services.

The former usually produces greater motivation, and results in a greater awareness of personal health needs and their importance. Those having negative opinions of dentists due to anticipated pain, the price of services, or other factors tend to have a lower demand for dental services, regardless of their perceptions of need.

In the long run, it would appear that it would be more economical and efficient to decrease need rather than to increase demand. An increase in demand may result in price increases for dental services. For example, given a slowly changing supply of dental manpower and dental services in response to demand, any immediate and significant increase in demand may tend to elevate the costs of care because more resources will be competing for the same (or higher level) services and supplies within a given time period. Decreasing need may serve to decrease the amount and rate of resource utilization that would otherwise be required, including the building of facilities and the training of personnel.

Data Limitations

One of the primary problems encountered by this study was the

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(4) Jeffers, James, R.; Bognanno, Mario F.; and Bartlett, John C.: On the Demand Versus Need for Medical Services and the Concept of "Shortage". American Journal of Public Health, Vol. 61, No. 1, January, 1971.

limited data that could be correlated. Data were frequently found to be incompatible (and sometimes based upon low response rates and estimates) and the information "systems" used to maintain and/or to collect dental data are not constructed to provide meaningful, adequate, comparable, or consistent data. In addition, most surveys have solicited data from the practitioners and little information is available from the consumers of dental services. The 1967 National Dental Manpower Study and the survey performed by this Dental Advisory Committee to the Ohio Board of Regents have had a significant response rate.

There has been relatively little or no impetus to date to develop a viable dental information system which lends itself to meaningful analysis and predictability. Most studies have been concerned with quantitative data which do not adequately reflect the level or quality of oral health care provided, and many have been based upon the wrong assumptions (e.g., "numbers" equals "quality", "dental manpower" is equivalent to "dental services", etc.). Such information has been used for policy-making and projections. For example, attempts to project manpower needs have often been based upon dentist/population ratios, which ignore the additional factors of demand, productivity, technology, the areas from which dentists draw their clients, the clientele being served, fluoridation or the lack of it in the area, and innovations in dental practice management.

Ohio does not yet possess a comprehensive "dental manpower information system", "dental care information system", or "oral health information system". (This situation is not limited to the

state of Ohio or to the field of dentistry. Information from other states and nationally-derived data are similarly limited.) The Ohio Board of Regents is developing an information system which will provide the number of enrollees and graduates in all of the health fields. Hopefully, this information will be linked with improved data concerning manpower availability and service demands resulting in an ongoing study of dental manpower in Ohio.

In spite of the foregoing weaknesses, an attempt has been made to develop realistic data and recommendations in such areas as retention, distribution, need, demand, the utilization of auxiliaries, the effects of third-party reimbursement, and the availability and utilization of professional dental care.

Dental Survey

A random sampling of dental practitioners in Ohio was undertaken in an attempt to gain more current and adequate information concerning dental practice in Ohio. A survey of this type could not address such questions as the quality of oral health care provided, consumer concerns, and other areas. Such an effort would have required time and resources beyond the scope of this project.

The sampling was conducted by allocating questionnaires among all Ohio dentists in proportion to their representation in the various health planning areas throughout the state. A total of 407 questionnaires was mailed to provide an approximate 10% sample of Ohio dentists with a response rate of 81%. The high response rate was possible because of the excellent assistance and cooperation of the Ohio Dental Association. (A copy of the questionnaire is included at the end of this report.)

The response to this survey demonstrated a representative geographic distribution from both rural and urban areas. The characteristics of the dental practitioner in Ohio are as follows:

Mean Age: 46 years
Ohio Born: 76%
Ohio High School: 81%
Ohio College: 81%
Ohio Dental College:
Case Western Reserve University, 25%
Ohio State University, 53%
Other Dental College: 22%

Post-D.D.S. education programs were attended by 37% of the dentists, with 44% of this group receiving their graduate education in Ohio. In addition, the study showed that:

(1) 67% are in active general practice, 13% are in orthodontics, and the remainder are in other dental specialties. Less that 1% are full-time dental faculty members.

(2) 82% of the dentists are in solo practice and on a specified day, randomly selected, dentists in group practice saw an average of twenty-three patients per day, with solo practitioners seeing an average of nineteen patients per day.

(3) dentists work an average of 38½ hours per week, 48 weeks per year.

(4) 50% of dentists indicate they could accept an average of eighteen additional patients per week.

(5) 42% of the responding dentists indicated they intend to incorporate expanded function auxiliaries into their office.

(6) 98% of dentists utilize auxiliary personnel with the dentist to full-time hygienist ratio 1:.23 and dentist to part-time hygienist 1:.26.

(7) the services provided by the dentists showed a frequency of:

Check-up and Prevention	27.19%
Restorations	37.00%
Extractions	10.75%
Orthodontics	7.21%
Crown and Bridge, & Inlay	5.15%
Removable Prosthodontics	5.13%
Endodontics	3.16%
Periodontics	2.41%
Other Surgical	2.00%

Comparable data from surrounding states are not available. However, it appears that greater production is possible in group practice, that existing dental services can be expanded for dental care, and that Amended Senate Bill 388 is likely to have an impact on the utilization of Expanded Duty Auxiliaries.

Northwest Ohio Health Manpower Assessment Project: Dental Survey(5)

This study gathered data from nineteen counties in northwestern Ohio, with a 68% response (368 dentists). Of those dentists who responded, 75% were in solo practice, with approximately 90% involved in the practice of general dentistry. This study showed that, for those dentists responding, 67 dental hygienists were employed on a part-time basis. This study did not determine if the limited use was because of poor utilization of personnel, the availability of personnel, or the practice did not warrent additional personnel based upon the demands for services. In addition, approximately 40% of the dentists in the northwestern section of the state indicated that they were not carrying a maximum work load and that they could care for additional patients.

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(5) Northwest Ohio Health Manpower Assessment Project. Section II - The Dental (D.D.S.) Survey. Medical College of Ohio at Toledo, June, 1974.

The Supply of Professional Oral Health Care

When the availability of oral health care is considered, the major issues are: (1) the current supply of dental care or services; (2) those services which can additionally be made available from the existing and projected dental manpower supply; (3) the general distribution of dental services and manpower among the population; and (4) the extent to which, if any, the current dental manpower supply needs to be increased. Again it must be emphasized that the supply of oral health care or services is not the same entity as the supply of dental manpower.

Factors affecting the supply of professional oral health care or services include the following: (1) professional (dentist) decisions with regard to choice of hours worked and weeks worked per year; (2) the efficiency of practice management; (3) number of dental chairs; (4) dentists' attitudes towards and the utilization of auxiliaries; (5) manpower available (dentists, auxiliaries, faculty, etc.); (6) migration of dental manpower; (7) working conditions; (8) remuneration; (9) statutes and regulations; (10) ease of entry into dental training; (11) physical capacity of dental schools (state and nation); (12) capacity and number of dental auxiliary training schools; (13) the cost of dental training; and (14) the curricula of dental schools (including the length of training period). Additional factors affecting the supply of dental manpower (and consequently, services) include: neighborhood and clientele served; type of practice; costs of operation; fear of crime and related problems; living conditions; socio-cultural preferences; and proximity to

supportive facilities.

The above factors, coupled with the greater demand for dental services in population centers, has contributed to the current pattern of distribution of dental manpower. This has been labeled "maldistribution" by some because of variations in the apparent number of people served per dentist in a given geographical area. Others would argue that dental manpower is not maldistributed from a demand perspective, and perhaps not even from the standpoint of need, since the most needs and greatest demands are usually found in the most populous areas. Past attempts to encourage dentists to locate and remain where apparent "shortages" exist have not been very successful. The argument of maldistribution has become part of the rationale for asserting that shortages exist overall and in specific geographic areas. Attempts to define "shortages" in terms of dentist/population or hygienist/population ratios do not recognize differences in productivity, technology, utilization of auxiliaries, and area demands for services. More importantly, dentist/population ratios should not by themselves be used for making policy or projecting manpower needs.

In addition, it should be noted that a "dental manpower" shortage is not the same as a dental service shortage. If there are no dental service shortages, there cannot be dental manpower shortages. Any decision to make additional professional dental care available to the public should be made with an emphasis on proper education, financial support, motivation, nutritional habits, and oral hygiene practices at the same time. Ultimately,

the effects of proper education, motivation, nutritional habits, and the implementation of improved oral health practices will increase the use of dental services while decreasing the need for complex and expensive dental services.

A number of publications and articles commenting upon and stating that a "shortage" of dental manpower or dental services exists do so primarily with respect to the "need" for such as defined by health professionals. As stated earlier, according to dental professionals 95% of the population is in need of dental services on a yearly basis. However, in terms of actual utilization, there may be little shortage. This is borne out by the fact that many dentists can accommodate more patients, and that less than 50% of the population actually visit the dentist on a yearly basis.

Utilization of Dental Services

Present information would seem to indicate that just making more services or manpower available may not have a significant effect upon the utilization of dental services, and consequently, upon the overall oral health of the population. A major reason for the oral health problems in the United States is that proven methods of prevention and control of dental diseases are not adequately or properly used.

The fact that barriers (real or imaginary) may exist to utilizing professional care is irrelevant for persons who do not wish to do anything about their oral health. These barriers include cost of services, fear of pain, etc. If so-called "free" dental care were available for everyone, there still is no

guarantee that it would be used extensively or as regularly as necessary for good oral health, or that the overall oral health of the public would be significantly improved or maintained. There is no assurance that such care would be complemented by good oral hygiene practices and good nutritional habits between visits to dentists.

Cost Factors - Oral Health Care

When considering the costs involved in oral health care, it is necessary to recognize that a portion of the costs of providing dental care are either partially or entirely outside of the dentist's control. These include the cost of dental equipment and supplies, dental laboratory fees, dental laboratory location, continuing education costs, statutes and regulations, insurance company requirements, malpractice insurance, oral hygiene practices and nutritional habits of consumers, and the use or non-use of fluorides.

Factors affecting the cost of utilizing dental care include distance travelled, cost of third-party plans, and opportunity cost. "Opportunity cost" usually consists of those things which must, at least temporarily, be foregone in order to visit a dentist. These factors include time which could be spent on other activities, and income which may be lost because of time off from work. The latter has a greater impact on hourly workers.

Some of the following costs (not all are measurable in dollars but, nevertheless, may be real) of not utilizing professional dental care are: possible higher short-term and long-term dental

costs, loss of teeth, impaired mastication, impaired facial appearance, impaired work efficiency, additional time lost from work, speech problems, emotional problems, and loss of or reduced social acceptability.

Third-Party Reimbursement

This mechanism permits the consumer to receive services from or through a dentist, with payment being made (in whole or in part) by a third party, such as an employer or an insurance company.

Due to the relative newness of third-party reimbursement programs for dental care in Ohio, it is estimated that it will be a minimum of two more years before sufficient and reliable data are available to evaluate such programs. At present, third-party payment mechanisms generally limit their coverage and, as a result, utilization is affected not only by the amount of coverage provided, but also by the size of the deductible costs and the income of the consumer.

Approximately thirty-five to forty insurance companies operating in Ohio are involved in or are becoming involved in dental insurance programs. According to the Ohio Dental Association, the utilization rate of these programs is approximately 70% (in terms of the number of employees eligible to use them) in the first year of coverage, after which it drops to a level of about 40%.

The primary factor to be considered with regard to dental insurance programs or any other type of third-party arrangement is the impact of such on oral health. It is possible that the nature of the program--including payment arrangements--may result in under-treatment, over-treatment, or just inadequate treatment in

terms of the quality of work performed.

One of the major third-party programs now in existence is that of the United Auto Workers (UAW). Although the UAW contract is too new for an evaluation of its effects in any area, a review of some of its provisions seems to indicate:

(1) Although coverage may not be provided for all types of materials, patients may elect higher levels of treatment and materials, with the individual assuming a part of the cost. By this third party mechanism, many people are receiving professional dental care for the first time.

(2) Preventive dentistry (plaque control, dental education, including dietary and oral hygiene instruction, etc.), which is the foundation of any good oral health program, is practically excluded from coverage. Dentists are not reimbursed for the "dental health education" programs, the aims of which are preventive dentistry. The public usually visits the dentist's office to "have something fixed or examined". The general public seldom accepts or participates in programs on why good oral care is needed or on how to avoid certain dental problems in the future.

(3) In anticipation of coverage to be provided with the institution of a third-party program, many people may postpone necessary dental treatment until they are eligible for coverage. This may result in a lower level of oral health than necessary, and higher dental expenses in the future.

Data which suggest that the cost of dental care may be increased with third-party programs is partially substantiated by the results of a study undertaken by the Leonard Davis Institute

of Health Economics, The University of Pennsylvania. In this study, The Attitudes and Anticipated Behavior of Dentists Under Various Reimbursement Arrangements, it was noted that:

> The responses of the dentists indicate that fees will likely be increased because of the existence of insurance coverage, and, more interestingly, that the magnitude of the increase will depend upon the reimbursement arrangements in the coverage.

If prices were to be driven up by third-party programs, it could force more people to avoid seeking dental care, with an overall negative effect on the oral health level of the population.

Dental Manpower - Ohio and the United States

Ohio's Dental Schools

Ohio has two dental schools--one at The Ohio State University and the other at Case Western Reserve University--which together produced an average of 200 dentists per year from 1963 to 1973, ranging from 187 dentists (1968) to 226 dentists (1973).(6) By 1978, over 300 dentists will graduate each year.

Case Western Reserve University School of Dentistry admitted 102 students and The Ohio State University College of Dentistry admitted 200 students in the 1974 class. (The Ohio State University College of Dentistry is the largest dental school in the United States.) As a result of this increase in the number of admissions at the two dental schools, Ohio will rank fifth in the nation in the numbers of dentists graduating per year in 1975. A review of the classes at The Ohio State University College of Dentistry

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(6) Chirikos, T.N.; Engler, D.; and McMillan, J.A.: Preliminary Data Set, Dental Manpower Study. Center for Human Resource Research, The Ohio State University, 1974.

indicates that 98% of the students were Ohioans. This has been consistent since the 1960's. Data available from Case Western Reserve University School of Dentistry and The Ohio State University College of Dentistry indicate the origin of students presently enrolled to be as follows:

The Ohio State University
College of Dentistry

Origin of Dental Students (First to Fourth Year)

Total Students: 723
Ohioans: 714 (98.8%)
Non-Ohioans: 9 (1.2%)

Student Group	No. Ohio Students	No. Non-Ohio Students	Total
Fourth Year Students	154	1	155
Third Year Students	176	3	179
Second Year Students	188	2	190
First Year Students	196	3	199
Total	714	9	723

Number of Counties Represented: 71

Case Western Reserve University
School of Dentistry

Origin of Dental Students (First to Fourth Year) (7)

Total Students: 368
Ohioans: 199 (54%)
Non-Ohioans: 169 (46% - includes 13 foreign students)

Student Group	No. Ohio Students	No. Non-Ohio Students	Total
Fourth Year Students	37 (47%)	41 (53%)	78
Third Year Student	47 (55%)	39 (45%)	86
Second Year Students	53 (53%)	47 (47%)	100
First Year Students	63 (61%)	41 (39%)	104
Total	200 (54%)	168 (46%)	368

(7) School of Dentistry, Case Western Reserve University. School of Dentistry Bulletin: 1974-75. Cleveland, 1974.

Case Western Reserve University
School of Dentistry (cont.)

No. of Ohio Counties Represented: 29

No. of Other States Represented: 23
No. of Other Countries Represented: 8

Ohio Counties Represented, O.S.U. and C.W.R.U.

Adams	1	Greene	15	Muskingum	6
Allen	7	Guernsey	1	Noble	1
Ashland	4	Hamilton	94	Ottawa	3
Ashtabula	8	Hardin	2	Perry	2
Athens	7	Harrison	1	Pickaway	5
Auglaize	2	Henry	2	Portage	7
Belmont	5	Highland	2	Preble	4
Butler	17	Holmes	3	Putnam	4
Carroll	3	Huron	2	Richland	10
Champaign	2	Jackson	1	Ross	5
Clark	8	Jefferson	6	Sandusky	3
Clermont	2	Lake	10	Scioto	12
Clinton	2	Lawrence	3	Seneca	2
Columbiana	3	Licking	6	Shelby	1
Coshocton	1	Lorain	17	Stark	35
Crawford	2	Lucas	58	Summit	51
Cuyahoga	195	Mahoning	18	Trumbull	19
Darke	3	Marion	4	Tuscarawas	3
Defiance	2	Medina	9	Union	1
Delaware	4	Mercer	2	Van Wert	1
Erie	1	Miami	4	Warren	5
Fairfield	4	Monroe	1	Washington	4
Franklin	116	Montgomery	63	Wood	3
Fulton	1	Morrow	1	Wyandot	1

The increase in the number of Ohio students entering the Case Western Reserve School of Dentistry has been associated with the state subsidy. This subsidy assured that the increase in class size at Case Western Reserve would be from Ohio students.

In 1974-75 admitting classes in the two schools of dentistry, 40 students were accepted at Case Western Reserve from out of state. Three students were accepted from out of state at The Ohio State University College of Dentistry. Fourteen Ohio students

were accepted into dental schools outside of the state of Ohio in the 1974-75 academic year.

Dental Schools - Ohio and the United States(8)

Ohio and the immediate surrounding states (Indiana, West Virginia, Pennsylvania, Kentucky, and Michigan) have 11 of the existing 51 dental schools (over one-fifth, or 22%) in the United States. The areas adjacent to these states (Wisconsin, Illinois, Missouri, Tennessee, Virginia, Maryland, New York, Washington, D.C., and New Jersey) have 17 dental schools, plus two under way, for a total of 19. Consequently, Ohio and these surrounding areas have 28 of the existing 51 dental schools (over one-half, Or 55%) in the United States.

Listed below are the states with dental schools now, or with schools or classes under way:

Ohio and Immediate Surrounding States

	No. of Schools	No. of 1974 Graduates
Pennsylvania	3	383
Ohio	2	236
Michigan	2	222
Kentucky	2	124
Indiana	1	100
West Virginia	1	51
	11	1,116 (24.9% of all 1974 graduates)

(8) American Dental Association, Annual Report, Dental Education, 1974/75. Chicago: American Dental Association, 1974.

Other Surrounding States or Areas

	No. of Schools	No. of 1974 Graduates
Illinois	4 (1 under way)	298
New York	4 (1 under way)	294
Missouri	2	208
New Jersey	2	191
Washington, D.C.	2	182
Tennessee	2	179
Maryland	1	127
Wisconsin	1	112
Virginia	1	93
	19	Subtotal 1,684 (37.6% of all 1974 graduates)
		Cumulative 2,800 (62.5%)

Acccrding to the above data, in 1974 less than one-third of the states produced nearly two-thirds of all the dental graduates in the United States. Ohio and the immediate surrounding states produced about one-fourth of all the dental graduates in the United States.

Other States in Eastern U.S.

	No. of Schools	No. of 1974 Graduates
Massachusetts	3 (1 under way)	132
Georgia	2	116
Minnesota	1	109
North Carolina	1	72
Iowa	1	64
South Carolina	1	60
Alabama	1	53
Louisiana	1	29
Connecticut	1	11
Mississippi	1	(school or classes under way)
Florida	1	(school or classes under way)
	14	Subtotal 646 (14.4% of 1974 graduates)
		Cumulative 3,446 (76.9%)

Total dental schools, eastern U.S.: 44 (76% of total number of schools existing or under way)

Remaining States

	No. of Schools	No. of 1974 Graduates
California	5	554
Texas	3	211
Nebraska	2	109
Oregon	1	81
Washington	1	78
Colorado	1	(school or classes under way)
Oklahoma	1	(school or classes under way)
	14	Subtotal 1,033 (23.1% of 1974 graduates)

Cumulative 4,479 (100%)

Total dental schools, United States: 58 (including 7 under way)

The following states do not have dental schools:

Maine	Idaho
New Hampshire	Montana
Rhode Island	Nevada
Vermont	New Mexico
Delaware	Utah
Arkansas	Wyoming
Kansas	Alaska
North Dakota	Hawaii
South Dakota	Arizona

Total states not having dental schools: 18

From the foregoing data concerning Ohio and the other states, it is quite apparent that Ohio (and the midwest area) does not have a dentist production problem. As noted earlier, the increase in class sizes in the two dental schools will result in Ohio being the fifth largest producer of graduating dentists in the nation. In the most populated states, Ohio will be the third largest producer of dentists per capita.

TABLE I

Dentist Production in Metropolitan States

	No. of Admissions, 1974-75	Admissions/100,000 Pop.
California	594	1/38,000 (4th)
Illinois	371	1/30,000 (2nd)
New York	355	1/50,000 (5th)
Ohio	302	1/36,000 (3rd)
Pennsylvania	442	1/25,000 (1st)

Dentist production in a given state is not the major factor which determines the number of dentists practicing in a state. For example , in 1970 eight states without dental schools had more dentists per unit of population than Ohio (another state without a dental school had the same ratio as Ohio); six states with one dental school had more dentists per unit of population than Ohio; and six states with two dental schools had more dentists per unit of population than Ohio.(9)

Active Dentists in Ohio

One of the major problems encountered in this study was that of obtaining accurate information on dental manpower--either nationally or statewide. Because of licensure requirements, data are immediately available on a statewide basis for re gistered dentists and dental hygienists. No complete data are available from any sources on the actual number of active dentists, active hygienists, active assistants, or active dental laboratory technicians.

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(9) United States Department of Health, Education and Welfare, Public Health Service, Health Resources Administration, Bureau of Health Resources Development. The Supply of Health Manpower, 1974.

Based upon data obtained from the Ohio State Dental Board, one can construct meaningful estimates of the number of active dentists in Ohio. Table II (page 22) indicates the number of dentists registered in Ohio for the period 1971-1974; the estimated number of active dentists for those years; and the number of active dentists added to Ohio's dental manpower for each year. From 1971 to 1974, the estimated number of active dentists in Ohio incresed from 4,017 to 4,058, giving an average annual estimated gain of 13.7 active dentists per year practicing in Ohio. This assumes that 82% to 85% of the dentists registered in Ohio (excluding out-of-state dentists registered in Ohio) are actively practicing in Ohio.

Although Ohio-trained dentists contributed approximately 78% of the state's dentists during the 1963-1973 period,(10) a review of the combined retention rates of dental school graduates for Ohio's two dental schools reveals that the percentage of dentists retained in Ohio has been declining since 1967 from over 56% to approximately 22% in 1973.(11) The figures shown in Table III (page 23) represent American Dental Association (ADA) members. When adjusted to account for all Ohio graduates, the percentage of retention of graduates of The Ohio State University College of Dentistry is higher than that of graduates of Case Western Reserve University

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(10) Chirikos, T.N.; Engler, D.; and McMillan, J.A.: Preliminary Data Set, Dental Manpower Study. Center for Human Resource Research, Ohio State University. 1974.

(11) Although the 22% figure for 1973 may eventually show some upward adjustment, it is not likely to be great (if it increases at all), if the data on the net addition of active dentists to Ohio by year for the 1971-1974 period reflect what is actually happening currently.

TABLE II

Dentists and Hygienists Per Dentist Registered in Ohio
April 1971-April 1974

Year	Total D.	H/D	Ohio D.	H/D	Out-of-State D.	H/D	Est. Active D. 82% ** 3945	Est. Active D. 85% 4089	Estimated Average
1971	5319	.23	4811	.24	508	.44			4017
1972	5350 (+31)	.29	4824 (+13)	.27	526 (+16)	.50	3956	4100	4028 (+11)
1973	5357 (+7)	.27	4842 (+18)	.24	515 (-11)	.54	3970	4116	4043 (+15)
1974	5367 (+10)	.36	4860 (+18)	.33	507 (-8)	.61	3985	4131	4058 (+15)
1971-74	+48 (.9%)		+49 (1.0%)		-1		+40 to +42		+41 (1.0%)

* Includes retired dentists and those in military service, as well as those not working as dentists, but who have maintained their registration.

** These estimates are based upon several sets of data which indicate approximately the same percentages of active dentists compared to registered dentists. For example, data obtained from the Statistical Abstract of the United States, 1974 (p. 73) indicated that approximately 82 percent of the dentists registered in the U.S. were active dentists. Computation from state dental board data for 1973 and 1974 indicated that approximately 83 to 84 percent of the dentists registered in Ohio were actively practicing in Ohio. Computation from ADA survey data indicated that approximately 84 to 85 percent of the dentists registered were actively practicing dentistry.

According to the above figures, Ohio has gained 16.3 registered dentists per year from 1971-1974, but only 13.7 active dentists per year.

SOURCE: Ohio State Dental Board Data.

TABLE III (12)

Retention Rates of Dental Graduates in Ohio, OSU and CWRU
1963 - 1973

Year of Graduation	No. Grads OSU College of Dentistry	No. OSU Grads Practicing in Ohio by Yr. of Grad.	Percent Retained in State	No. Grads CWRU College of Dentistry	No. CWRU Grads Practicing in Ohio by Yr. of Grad.	Percent Retained in State	Combined Retention Rate (Percent)
1974 (13)	-	-	-	-	-	-	-
1973	141	36	25.5	85	14	16.5	22.1
1972	142	51	35.9	66	17	25.7	32.7
1971	147	62	42.2	66	14	21.2	35.7
1970	143	64	44.7	60	14	23.3	38.4
1969	136	70	51.5	62	15	24.2	42.9
1968	133	70	52.6	54	17	31.4	46.5
1967	133	83	62.4	59	25	42.3	56.2
1966	130	78	60.0	59	26	44.0	55.0
1965	134	85	63.4	56	17	30.3	53.7
1964	133	87	65.4	59	26	44.0	58.8
1963	142	80	56.3	63	31	49.2	54.1
TOTAL	1514	766	-	689	216	-	-

(12) Chirikos, T.N.; Engler, D.; and McMillan, J.A.: Preliminary Data Set, Dental Manpower Study. Center for Human Resource Research. Ohio State University, 1974.

(13) 1974-71 data do not include recent graduates who are practicing out-of-state as interns, researchers, or serving in the military.

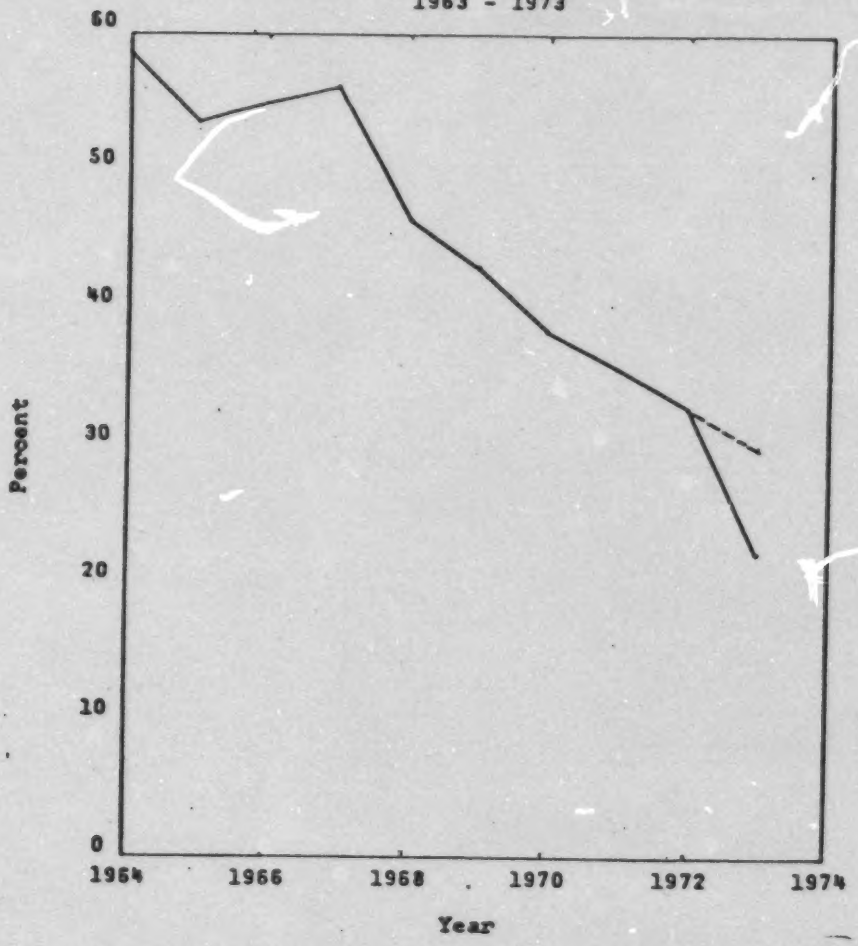
School of Dentistry. In 1971, The Ohio State University College of Dentistry had 98% Ohio students with a retention of 42%. During the same year, Case Western Reserve had 50% Ohio students with a retention of 21%. The 1972, 1973 and 1974 data for retention of Ohio dental graduates is not interpretable because some graduates are presently in a stage of changing their geographic location related to participation in the military, internships, residency programs and preceptor programs. There is an estimated three-year lag time required to evaluate the geographic location of graduates.

When depicted graphically, the retention rates for the 1963-1973 period (using ADA members data) show a nearly straightline decrease in retention from 1968 to 1971. If the line is projected to 1974, the retention rate will be less than 30% for 1973, and approximately 27% for 1974. The sudden drop from 1972 to 1973 reflects the continued mobility of the dentists in graduate education, in the military, and in preceptor programs.

It could be argued that the gradual decline of dentists retained in Ohio is a reflection of the differences in demand for dental services and, hence, dental manpower, in Ohio versus other states. It also is possible that dentists may wish to practice in other states for reasons other than demand considerations or income opportunities (i.e., the desire to live in the south, the far west, or the New England states). Regardless of the reasons for the low retention rate, it appears that just graduating more dentists from new or existing dental schools in Ohio will not significantly increase the number of dentists practicing in Ohio.

GRAPH I

Combined Percentage Retention Rates of
Dental Graduates in Ohio, OSU and CWRU
1963 - 1973



Dentist Retention Rates - Selected Surrounding States

The following states were contacted regarding their dentist retention rates: Kentucky, Indiana, Illinois, and West Virginia. All indicated that retention rates were low (i.e., less than 50%). The data from the University of Louisville did not speak to the overall retention rate for the state. It did show that less than 20% of the school's dental graduates from 1969 through 1973 remained in Kentucky. Data from the University of Kentucky indicated that, as of September 1974, approximately 41% of all graduates to date were practicing in Kentucky.

Graduate Dental (Post-D.D.S.) Education

There is increasing evidence that dental school graduates are entering post-D.D.S. programs for one to three years for additional clinical experience before entering the private practice of dentistry. Dental schools and hospital clinical programs have been developing graduate programs in orthodontics, endodontics, oral surgery, pedodontics, oral pathology and general practice. The general practice of dentistry with one to two years of post-D.D.S. clinical experience is becoming an increasingly common program in community hospitals. A review of these graduate programs in the most populous states is given in the table below.

TABLE IV

	No. 1st yr. Students	No. 1st year Post-D.D.S. Positions		
		Specialty	General Practice	Total
California	549	117	63	180
Illinois	371	107	38	145
Mississippi	208	141	19	160
New York	355	182	132	314
Ohio	302	56	25	81
Pennsylvania	442	115	37	152
Texas	288	93	29	122

In medical education a student who has his undergraduate and graduate programs in Ohio has a 75% chance of remaining in the state. If this information is applicable to dental education and the retention of dental graduates, then the development of graduate dental education programs is of critical importance to the retention of dentists in Ohio. In a review of Ohio's dental graduates, it is apparent that those entering post-D.D.S. education programs are more likely to leave Ohio for their education. The above table demonstrates that Ohio has fewer graduate dental education programs than the other most populous states. If additional post-D.D.S. programs in general practice and other needed specialty programs were made available in Ohio, it is anticipated that there would be an increased retention of Ohio's dental graduates.

Trends in Dental Manpower Growth: United States vs. Ohio

A recent publication of the U.S. Department of Health, Education and Welfare entitled "The Supply of Health Manpower" (October, 1974) estimates that dentists on a national basis are projected to increase from 102,220 in 1970 to 154,910 in 1990,[14] an increase of nearly 52%. This projection is based upon two major assumptions:

(1) Upon expiration in FY 1974 of the Comprehensive Health Manpower Training Act of 1971, aggregate public and private funding will be adequate to at least maintain (though not necessarily to increase) the productive capacity of professional schools needed to ensure the continuation of enrollments at the level resulting from this Act.[15]

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(14) U.S. Department of Health, Education and Welfare, Public Health Service, Health Resources Administration, Bureau of Health Resources Development: The Supply of Health Manpower, 1974.

(15) Ibid.

(2) The supply flow will be generally unaffected by any significant changes in the health care delivery system.(16)

The first assumption in this manpower study speaks to the maintenance of the productive capacity of professional schools, with the estimated projections in the above study indicating an expected increase of 50% in the dental graduates by 1982. In 1970, 3,760 dentists graduated from U.S. schools. In 1980, the graduating number is projected to be 5,440. As a result of this increase, the supply of active dentists by national manpower data would suggest that the dental manpower of 102,000 in 1970 will be increased to 126,000 by 1980 and 155,000 by 1990. The 50 dentists per 100,000 in 1970 will then be increased to 56 dentists per 100,000 by 1980 and 62 dentists per 100,000 by 1990.

Using the two major assumptions, HEW has estimated that the total formally trained, active dental hygienists(17) will increase from 15,000 in 1970 to 28,400 in 1990, and the formally trained, active dental assistants will increase from 9,200 in 1970 to 76,500 in 1990. This does not provide an accurate picture of the total auxiliary personnel available and/or working because many dental assistants are not formally trained, but trained by dentists.

Graph II (page 29) shows the comparative growth rates for dentists and auxiliary personnel in the U.S. between 1970 and 1990.

Based upon data contained in Table II (page 22) of this report,

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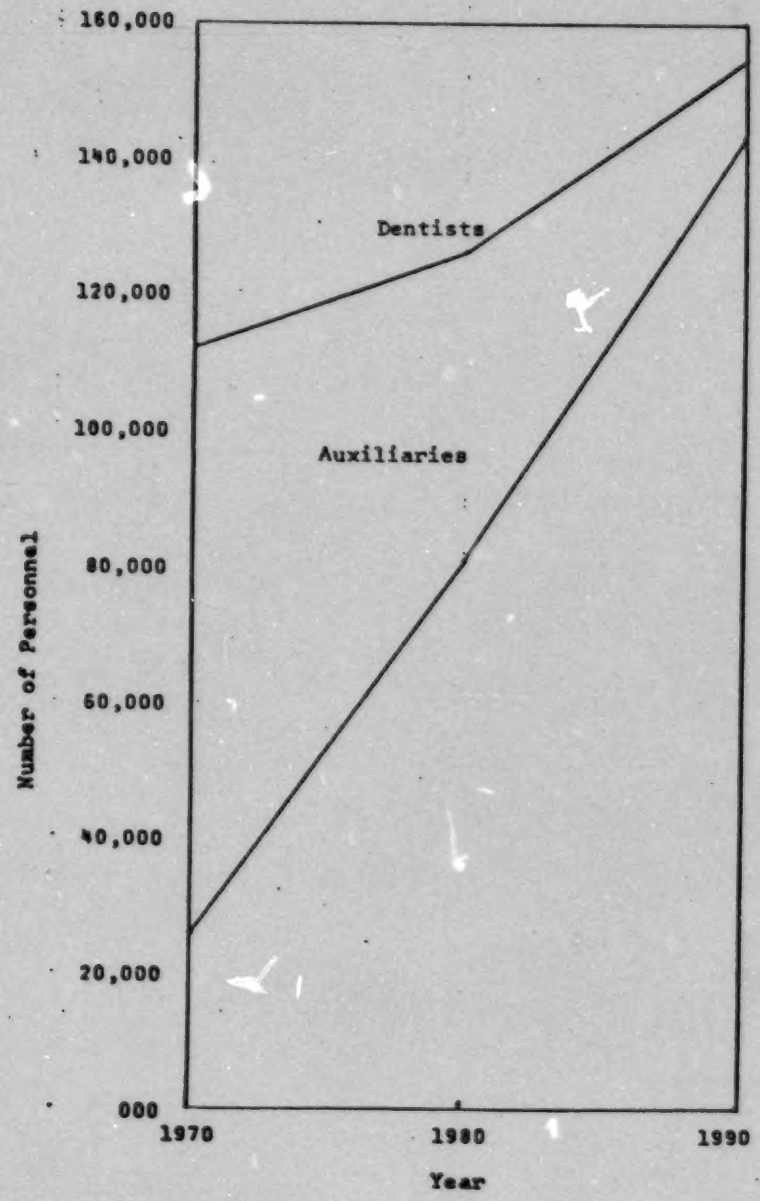
(16) Ibid.

(17) Ibid

GRAPH II

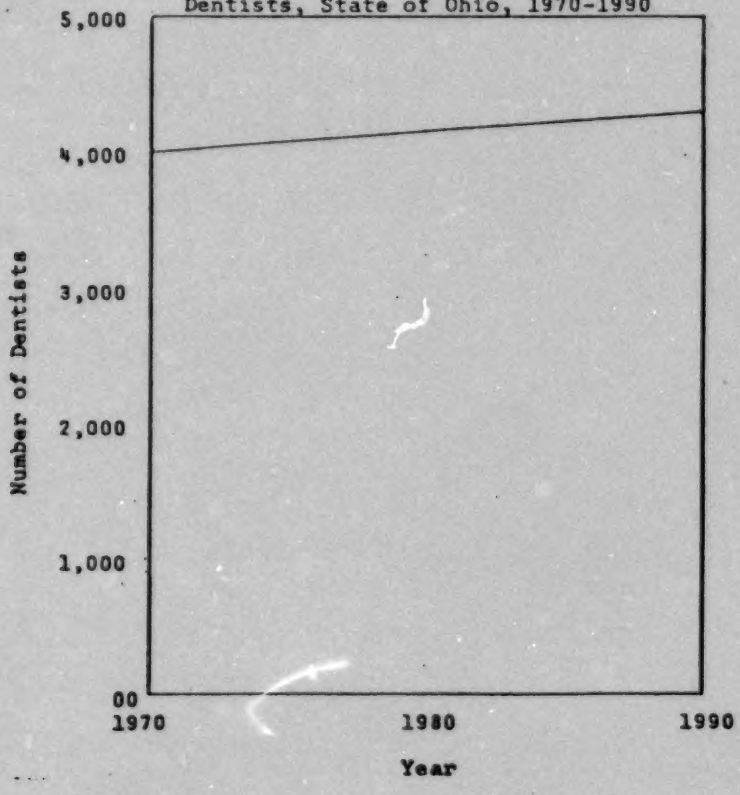
Comparative Projected Growth Rates, Dentists vs. Auxiliary Personnel, United States, 1970 to 1990



it was estimated that Ohio had 4,000 active dentists in 1970. This table also showed that the growth rate between 1970 and 1974 was slightly less than 14 dentists per year. Assuming no significant changes in output or retention during the 1970-1990 period, and assuming a net addition of 15 dentists per year for that period, Ohio will have approximately 4,300 dentists by 1990, which is an increase of 7.5%. However, the significance of this apparently small increase cannot be determined without evaluating the possible effects of changes in technology, productivity, and other factors affecting the provision of dental services. The above projection portrayed graphically is shown below.

GRAPH III

Estimated Increases in the Number of Dentists, State of Ohio, 1970-1990



Thus, while dentists in the U.S. are projected to increase by 52%, Ohio's dentists would increase by only 7.5%. This assumes that there will be no major change in the number of dental graduates retained in Ohio, nor will there be an increase in the number of dental graduates from other states entering Ohio. It should be anticipated that the 50% increase in the number of graduates in the United States will result in additional graduates moving into Ohio or Ohio graduates remaining in Ohio.

Dentist Distribution in Ohio

Ohio currently has one dentist per approximately 2,700 people, whereas the national average is approximately one dentist per 2,100 people. Thus, at the present time Ohio is below the national average in regard to the dentist/population ratios. However, the ratios are not adequate measurements of projected manpower needs, nor should they be utilized for making policy, because such ratios without other considerations ignore demand, productivity, technology, preventive dentistry and the clientele being served. As in other vocations, dentists tend to locate in areas which meet their personal preferences geographically, climatologically, and culturally, and which have a demand adequate to meet their economic desires.

Ohio, like other states, does not have an equal distribution of dentists or an equal demand for dentists across the state. This can be seen by the map on page 32, which shows Ohio population by county in 1970, with the estimated number of practicing dentists per county as of April 1, 1974. (Due to little change in population since 1970, the possible errors which could result from using 1970

MAP A

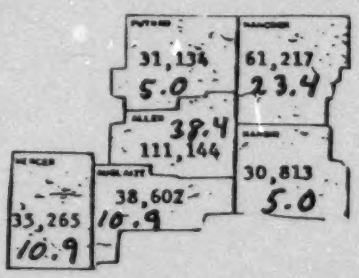
1970 POPULATION BY COUNTIES IN OHIO

Estimated Number of Active Dentists (April 1, 1974)

NOTE: Regions outlined for analytical purposes only.

population data and 1974 dentist data are insignificant.) The figures were derived from State Dental Board data, and adjusted downward by 16.5% to allow for retirees.(18)

Although dentist/population ratios could be computed for each county, the figures would be basically meaningless, because data showing which people utilize which dentists are not available. This would require an origin and destination survey. Some of the distribution "oddities" which cannot be explained without further data may be seen in the combination of counties below.



Auglaize and Mercer Counties have approximately the same population and number of dentists. Hancock County, adjacent to Putnam County, has almost twice as many people, but nearly five times as many dentists. The same situation applies with regard to Hancock and Hardin Counties. Allen County has over three times as many people as Putnam or Hardin Counties, but over seven times as many dentists. It is quite possible that the majority of the population

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(18) Data from the Ohio State Dental Board, the American Dental Association, and national health statistics have shown a range of 15% to 18% retirees among registered dentists.

in Putnam and Hardin Counties utilizes the services of dentists in Allen and Hancock Counties. This may partially account for the apparent low number of dentists in Putnam and Hardin Counties. The dentist to population ratios in the various regions of Ohio are as follows: (map, page 32)

Northwest (Toledo), 1 dentist per 2,900 population

North (Cleveland), 1 dentist per 2,100 population

Northeast (Akron-Kent-Youngstown), 1 dentist per 2,900 population

Central (Columbus), 1 dentist per 2,100 population

Southeast (Athens), 1 dentist per 3,800 population

West (Dayton), 1 dentist per 3,000 population

Southwest (Cincinnati), 1 dentist per 2,900 population

The "deficiency" in the available dentists in the sectors of Ohio according to population would appear to be the greatest in the southwestern section. According to U.S. Department of Health, Education and Welfare criteria of need,[19] there are eighteen counties in this state in which a deficiency of dental manpower exists:

Athens	Jackson
Belmont	Licking
Clinton	Logan
Columbiana	Madison
Coshocton	Meigs
Delaware	Morgan
Fulton	Ottawa
Hardin	Perry
Henry	Van Wert

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(19) U.S. Department of Health, Education and Welfare, Public Health Service, Health Resources Administration, Bureau of Health Resources Development. Letter to Dr. John W. Cashman, Director of health, October 28, 1974.

Dental Auxiliaries

Ohio has forty-four schools (public and private) producing various types of dental auxiliaries. These are as follows:

Dental Hygienists

Ohio has seven schools which currently train dental hygienists:

The Ohio State University (4-year program)
Cuyahoga Community College
Lakeland Community College
Sinclair Community College
Raymond Walters General and Technical College (Cincinnati)
Owens Technical College (Perrysburg)
Shawnee State General and Technical College

Two additional programs are currently planned--one at Youngstown State University and the other at the Lima branch of The Ohio State University.

The growth in the number of registered dental hygienists in Ohio has fluctuated considerably over the last few years, as can be seen in the table below:

TABLE V

Dental Hygienists Registered in Ohio
April 1971 - April 1974

Year Educated	Ohio Hygienists	Out-of-State Hygienists	Total Hygienists
1971	1151	226	1377
1972	1291 (+140)	265 (+39)	1556 (+189)
1973*	1180 (-111)	277 (+12)	1457 (- 99)
1974	1602 (+422)	310 (+33)	1912 (+455)
1971-74	+451	+84	+535

* A new registration system was utilized beginning in 1973. This helps to account for the apparent decrease in 1972.

SOURCE: Ohio State Dental Board data.

In the absence of additional information, it is difficult to determine the reasons for the variations from year to year in the number of registered dental hygienists in Ohio. The actual number of active dental hygienists per dentist is not know. However, one can estimate that Ohio has approximately three dentists for every registered hygienist (see Table II).

Dental Laboratory Technicians

Ohio has five schools which train dental laboratory technicians. These consist of the following:

2 private schools: Cleveland Institute of Medical-Dental Assistants
Toledo Medical Educational Center, Inc.

3 public or technical schools: Columbus Technical Institute
Toledo Scott High School
Montgomery County

Note: Columbus Technical Instituts is the only one currently accredited.

Dental Assistants

Ohio has thirty-two schools which train dental assistants. These include the following:

4 private schools: Cleveland Institute of Medical-Dental Assistants
Akron Institute of Medical-Dental Assistants
Career Academy (Columbus)
Toledo Medical Education Center, Inc.

28 public or technical schools, including:
Jane Addams (Cleveland)
Paul C. Hayes (Grove City)
Jefferson County Technical Inst.

Note: The adult programs at Paul C. Hayes and Jane Addams are the only ones which are accredited.

According to James E. Bartholomew, D.D.S., Division of Vocational Education, State Department of Education, approximately 50% of those trained in dental assisting work as dental assistants, and approximately 10% work in related fields. He also noted that about one out of ten dentists hires trained assistants (most train thei: own personnel).

Use of Expanded Duty Auxiliaries

Various studies have shown that the use of additional auxiliary personnel can greatly increase productivity in terms of the number of patients seen, and the units of service provided. The significance of this depends largely upon whether the demand in a given area is adequate to justify hiring additional personnel.

As noted earlier, Amended Senate Bill 388, which authorizes "the performance of expanded dental duties by qualified auxiliary personnel", may have very little impact upon current practices, but does permit an increase from one to two dental hygienists per dentist. In addition, this bill provides an opportunity for dental assistants to perform additional duties.

In the absence of adequate data, the current utilization of expanded duty auxiliaries in Ohio cannot be known. It is probably parallel to practice across the nation. The latest data available in this area are four to five years old. They do not include changes brought about by revisions in the laws of a number of states in 1970 and 1972 regarding the use of expanded duty auxiliaries.

Regardless of what expanded duty auxiliaries are permitted to do in providing dental services, the essential questions are these:

(1) Is the demand for dental services in a given area sufficient to justify the hiring of such personnel?

(2) What effect will the services of these personnel have on the quality of oral health care provided?

(3) How can (or will) the impact of the utilization of expanded duty auxiliaries be measured?

Cost Estimate of a New Dental School

If a new dental school were to be built, a projection of costs should be made for the purpose of resource allocation. Construction costs would be high, and the equipment necessary to adequately teach the students would be expensive.

Start-up support would be needed to establish a full complement of dental teachers (orthodontists, periodontists, general practitioners) and to assure that the students will be exposed to a full range of patient needs and dental care. The estimates for student subsidies are based upon that for the present biennium of $4,000 per student with a 5% escalation in costs per year. The ten-year projections of estimated costs for a new dental school are included in this report.

TABLE VI

COST ESTIMATE - NEW DENTAL SCHOOL
50 Students/Year Maximum

Construction	Start-up	Student Subsidy		Number of Students Admit	Number of Students Enrollment
$15,000,000*	$125,000			0	
	$125,000			0	
	$500,000	$100,000)	$373,000	25	
	$500,000	$273,000)		40	65
	$500,000	$507,150)	$1,271,150	50	115
	$500,000	$764,000)		50	165
	$500,000	$923,400)	$1,943,000	50	190
	$500,000	$1,020,000)		50	200
	$250,000	$1,070,000)	$2,194,000	50	200
	$250,000	$1,124,000)		50	200
$15,000,000	$3,750,000		$5,781,550		

Total 10-year projections: $24,531,550

*Construction costs estimated by comparison with new addition to O.S.U. College of Dentistry to accommodate 50 additional students.

STATE AND NATIONAL ACTIVITIES

State

1. A model dental health education curriculum has been proposed to the Ohio Department of Education, and has received a positive response from the Superintendent of Instruction.
2. The Metropolitan Health Planning Corporation of Cleveland, Ohio, has been granted $1 million to conduct a dental health education program in Ohio with the assistance of the Ohio Dental Association and the Ohio Department of Education. (The grant came from funds received as a result of a lawsuit against various manufacturers of tetracyclene). The funds are to be supervised and administered by a Public Health Trust of the Treasurer of State, the Superintendent of Public Instruction, and the Director of the Ohio Department of Health. An advisory committee for the project has not been named yet.
3. Akron, Ohio, recently (1972) instituted a well-organized and supported plaque-control program which involved school administrators, the Akron Dental Society, Akron Community Trust, the Beacon Journal Fund, the National Dairy Council, and others in its first year of operation. Follow-up evaluations have indicated that the program has been successful. Dental health education plays the major role in this program.
4. A bill is being proposed in the General Assembly which would amend Section 3313.60 of the Ohio Revised Code to separate health and physical education.
5. The dental health education program of the state health depart-

ment is conducted primarily through four licensed dental hygienists who have teaching certificates, and four licensed dentists. The hygienists present information on basic oral hygiene, give demonstrations of tooth care, and make topical applications of fluorides with the toothbrush. Dentists conduct screening examinations, perform scaling and cleaning, make topical applications of fluorides, and present a dental health education program to students. The state program is operated mainly in low income areas, and largely in southeastern and southwestern Ohio. Emphasis is also given to factors such as low fluoride levels, low mean income levels, and disparities in manpower availability. According to the state health department, resources (dollars and people) are not adequate to conduct follow-up programs or to evaluate the effectiveness of what has been done to date.

National

1. From 1950 to 1971, the number of dentists per 100,000 population dropped from 58.2 to 56.7. During this time, dentists have become more efficient, and consequently, they have doubled their productivity.
2. The possible effects of proposed federal and state health legislation on oral health remain to be seen. It is quite possible that, independent of any state actions, federal legislation could "force" certain practices in oral health care which could override any state programs, or cause a revision of existing or proposed programs.

3. On February 6, 1975, a bill (H.R. 2956) was introduced in Congress which, if passed, would extend Title VII of the Public Health Service Act. Title VII provided grants for the construction of health research facilities; grants and loan guarantees and interest subsidies for the construction of teaching facilities for medical, dental, and other health personnel; student loans; scholarship grants; grants and contracts to improve the quality of schools of medicine, dentistry, etc.

4. Another bill currently being considered in Congress is H.R. 21 (introduced January 14, 1975), which would create a national system of health security. Section 23 of this bill would provide various types of coverage for professional dental care according to age. The bill also contains provisions for devices, appliances, and equipment prescribed by dentists (Section 26).

5. A bill known as H.R. 1 and the "National Health Care Services Reorganization and Financing Act" also was introduced in Congress on January 14, 1975. This bill would establish a new program of comprehensive health care benefits (including catastrophic coverage) and health care delivery to be available to all residents of the United States and to be financed by payroll deductions, employer contributions, and tax credits.

6. Public Law 93-641 (93rd Congress, S. 2994, January 4, 1975), known as the "National Health Planning and Resources Development Act of 1974", amended the Public Health Service Act by adding new titles to assure the development of a national health

policy and of effective state and area health planning and resources development programs. The law requires that guidelines concerning national health planning policy be issued by the federal government by July 4, 1976. This law also requires the establishment of health service areas and health systems agencies for those areas. These agencies are to coordinate their activities with Professional Standards Review Organizations (PSRO). Requirements are also outlined for state health agencies, which are the planning agencies for the states. These agencies are to be advised by Statewide Health Coordinating Councils.

CONCLUSIONS AND RECOMMENDATIONS

In summary, the available information indicates Ohio is graduating a sufficient number of dentists each year, but the retention of these graduates is extremely low. Although Ohio is the third largest producer of dentists per capita of the large metropolitan states, it has a very limited number of post-D.D.S. dental education programs to assist in retaining Ohio's dental graduates.

Dental auxiliary programs have increased and have been complemented by the legislative action which has permitted the expanded function of dental auxiliaries. With the increased utilization of auxiliary personnel, dentists will become more productive and will be more able to keep pace with growing demands for dental services.

However, Ohio, like its immediate surrounding states, does have a low dentist retention rate and does have varying dentist-to-population ratios throughout the state. In addition, Ohio does not have an efficient state-wide dental education program for good oral health for the public.

This report contains ten major recommendations:

1. It is recommended that Ohio should not establish a third dental school but develop programs to increase the retention of its graduates.

   At present, the state of Ohio is the third largest producer of dentists per capita in the United States, but Ohio's retention of its graduates is approximately 35%.

2. It is recommended that the legislature support a pilot post-D.D.S. education program to be initiated in the northwest area of the state with the Medical College of Ohio at Toledo. This program should be developed in conjunction with the dental associations and Ohio's two dental schools. This graduate

dental education program may involve the Medical College of Ohio hospital, community hospitals, community health centers, private offices, health departments and others. The Ohio Department of Health, the Ohio Board of regents, and the Ohio Dental Association would evaluate this project and report to the General Assembly regarding their findings.

Ohio will graduate over three hundred dentists per year, but there are only twenty-five general practice internship positions and sixty-five dental specialty residency positions in the state of Ohio each year. The availability of so few programs is a negative influence on the retention rate of Ohio's dental graduates, which is now at approximately 35%.

If this primary graduate education program improves the retention of Ohio's graduates, similar programs should be considered for other metropolitan areas of the state, including Akron, Athens, Cincinnati, Dayton and Youngstown.

3. It is recommended that a dental student loan program be initiated, with financial incentives for the practice of dentistry in Ohio, and special incentives to practice in underserved areas of the state.

This program, associated with community efforts to assist a new dentist to establish an office practice, may have a major effect upon the retention rate of Ohio's dental graduates. This program complements the graduate dental education program recommended for the northwest area of the state.

4. It is recommended that the Ohio Department of Education be supported in the continuation of the dental health education program in the schools of Ohio as a component of the general health curriculum.

Several pilot dental health education programs conducted in Ohio's public schools have shown great promise in preventive dentistry. Follow-up evaluations have shown reduced dental caries and a greater awareness of the importance of good oral health by the individual. Such programs are less expensive because they reduce the need and extent of care required in later life.

5. It is recommended that programs be initiated wherever necessary to use adequate levels of fluoride in community water supplies to assist in the reduction of the incidence of dental caries.

   Various studies have shown that the use of fluorides in community drinking water can reduce the incidence of dental caries by as much as 60%. Such a response to preventive dentistry can have a major impact on the health of the public

6. It is recommended that the Ohio Department of Health, working in conjunction with the Ohio Dental Association, be supported to assume responsibility for leadership in developing a public awareness program of good oral health.

   Present information suggests that 95% of the public is in need of dental services on a yearly basis but that less than 50% actually seek or receive dental services. A major component of this problem is related to public awareness and understanding of good oral health.

7. It is recommended that the Ohio Department of Health, in conjunction with the Ohio Dental Association, be supported to establish a state-wide registry of community needs and dental health services.

   Ohio does not have a centralized dental registry for the needs of the community. The Department of Health should be supported to cooperate with the communities to undertake this action and better coordinate community service needs with the dental education programs. A community would notify the Ohio Department of Health of its dental needs and indicate its ability to assist a new dentist in establishing a practice.

8. It is recommended that there be an on-going study of dental manpower in Ohio.

   To date, this report and survey are the most complete and accurate information available in Ohio. Such information should be continued on a regular basis to accomplish the following tasks:

   (a) a demand model should be established to show current and future demands for dental care;
   (b) a supply model should be established to show migration patterns, retention rates, use of auxiliary personnel, and production, functions and services.

The information gained from this type of study can be used for the wise application of public resources, both human and capital, in planning and producing dental health manpower of all types to serve the dental demands of the citizens of Ohio.

9. It is recommended that there be continued development of educational programs for dentists throughout Ohio to encourage the use of dental auxiliary, dental hygienists, and dental laboratory technicians.

The utilization of dental auxiliaries and dental hygienists within the dental office will improve the efficiency of the dentist as well as increase productivity. This dental health team is essential for the public's access to dental health services.

10. It is recommended that educational and training programs for expanded duties of dental auxiliary personnel be continued and be supported in cooperation with the dental scoieties, dental schools, and the state system in public, post-secondary higher education.

The expanded duties of dental auxiliary personnel increase the efficiency of the practicing dentist and should be supported.

Please answer the following questions and return the questionnaire by no later than one week. Fold, staple, and drop the postpaid response in the mail. If an answer to a question is zero, please write a zero in the space provided. If a question does not apply to you, please write "NA" (Not Applicable).

1. Name(Optional)_____ 2. Date of birth__/__/__ 3. Sex: M__ F__ 53

4. County and state of birthplace_____ 5. County and state of high school attended_____

6. College or university attended_____ County and state_____

7. Dental school attended_____County and state_____

8. Post-graduate training: Yes__ No__ If yes, institution_____

9. Are you currently practicing dentistry? Yes__ No__ If not, check one of the following, and return the questionnaire: __Retired __Health reasons __Another occupation __Other

10. ADA Member: Yes__ No__ If yes, first year of membership_____

11. Major field of practice (check only one):

__General Practice __Orthodontics __Prosthodontics __Endodontics __Other (Please specify)

__Oral Surgery __Periodontics __Pedodontics __Oral Pathology

12. Military dental practice. Yes__ No__ If yes, location_____ No. of years_____

13. Internship: Yes__ No__ If yes, location_____ No. of years_____

14. Current practice address and county of practice_____

15. No. of years practiced in current location____ Previous practice by county, state_____Yrs.

16. Do you now practice at more than one location? Yes__ No__ If so, where?_____

17. Type of practice: ___Private(Solo) ___Group If group, no. of dentists in group_____

18. No. of years in private practice_____ 19. No. of years in group practice_____

20. Average no. of hours worked per week___ 21. No. of weeks worked per year___

22. Do you believe that you are now carrying a maximum patient load? Yes__ No__

If not, how many more patient visits per week could you carry?_____

23. Total no. of dental chairs_____ 24. No. of chairs regularly used for patient care_____

25. Please indicate the no. of auxiliary personnel that you (or your group, if applicable) employ. "Full-time" is defined as being over 30 hours per week.

No. of full-time hygienists_____	Average no. of hours worked per week_____
No. of part-time hygienists_____	Average no. of hours worked per week_____
No. of full-time assistants_____	Average no. of hours worked per week_____
No. of part-time assistants_____	Average no. of hours worked per week_____
No. full-time receptionists_____	Average no. of hours worked per week_____
No. part-time receptionists_____	Average no. of hours worked per week_____

26. Do you have any intentions to incorporate Expanded Function Auxiliaries into your practice in the future (as recently authorized by the Ohio General Assembly in S.B. 388? Yes___ No___

27. Reason for visit: Please indicate how your case load is divided among the following categories on your next full workday after receiving this questionnaire:

Reason for visit	No. of patients receiving this service
a. Check-up and preventive services	
b. Restorations	
c. Extractions	
d. Removable prosthodontics	
e. Periodontics	
f. Orthodontics	
g. Endodontics	
h. Crown, bridge, and inlay	
i. Other surgical	
j. Total no. of patients seen during the above workday	

Note: It is recognized that a patient may receive more than one service, and may be included in the count for more than one category.

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28. Do you believe that the time that you spend on dental health education for your patients during an office visit is effective in promoting better personal oral health? Yes__ No__

29. What means of promoting better personal oral health would recommend? (Answer on back if necess.)

30. How do you believe that dental school curricula should be changed (if at all) in terms of length, content, or otherwise? (Answer on back if necess.)